417A. Proposed by ELMER SCHUYLER, Brooklyn, N. Y.

Solve $E(x^2) - E(3x) = 7$, where $E(m)$ is the largest integer in m. The value of x is to be in the form $4 + (y/32)$ where y is an integer.

This problem was incorrectly numbered 417.

SOLUTION BY A. M. HARDING, University of Arkansas.

If we draw the graphs of the functions $E(x^2)$ and $E(3x) + 7$ we find

$$E(x^2) = E(3x) + 7 = 20, \quad \text{if} \quad \sqrt{20} < x < \sqrt{21}; \quad \text{i. e.} \quad 4.4721 < x < 4.5826;$$

$$E(x^2) = E(3x) + 7 = 21, \quad \text{if} \quad 14/3 < x < \sqrt{22}; \quad \text{i. e.} \quad 4.6667 < x < 4.6904;$$

$$E(x^2) = E(3x) + 7 = 2, \quad \text{if} \quad -5/3 < x < -\sqrt{2},$$

$$\text{i. e.} \quad -1.6667 < x < -1.4142.$$

Now we must have $x = 4 + y/32$ where y is an integer. Hence

$$4.4721 < 4 + y/32 < 4.5826, \qquad \therefore y = 16, 17, \text{ or } 18.$$

And

$$4.6667 < 4 + y/32 < 4.6904, \qquad \therefore y = 22.$$

$$-1.6667 < 4 + y/32 < -1.4142, \qquad \therefore y = -181, -180, \cdots, -174.$$

GEOMETRY.

430. Proposed by DANIEL KRETH, Wellman, Iowa.

The distance between A and B is always a feet. A travels along a straight path at the rate of v_1 miles per hour, and B starts at the same time in the path behind A and travels in a curve at the rate of v_2 miles per hour. How far will B travel to reach the path in front of A, and how far to reach the path again behind A?

SOLUTION BY ELIJAH SWIFT, University of Vermont.

Take the origin at the place where B starts and the Y-axis through A. Then the coördinates of A at any time, t, are $(0, a + v_1 t)$, and those of B must satisfy the equations

$$(1) \quad x^2 + (y - a - v_1 t)^2 = a^2, \qquad (2) \quad \left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 = v_2^2.$$

Solving (1) for y, we have $y = -\sqrt{a^2 - x^2} + a + v_1 t$, where the negative sign holds until B is abreast of A.

Substituting this value in (2), we have a quadratic equation in dx/dt, from which we find

$$\frac{dx}{dt} = \frac{\sqrt{a^2 - x^2}}{a^2}\{-v_1 x + \sqrt{v_1^2 x^2 - a^2 v_1^2 + a^2 v_2^2}\},$$

the plus sign of the second radical being taken since dx/dt is positive.

From equation (2), we deduce $ds = v_2 dt$. Hence, we have

$$s \equiv v_2 t = 2 \cdot v_2 \cdot a^2 \int_0^a \frac{dx}{\sqrt{a^2 - x^2}\{-v_1 x + \sqrt{v_1^2 x^2 - a^2 v_1^2 + a^2 v_2^2}\}},$$